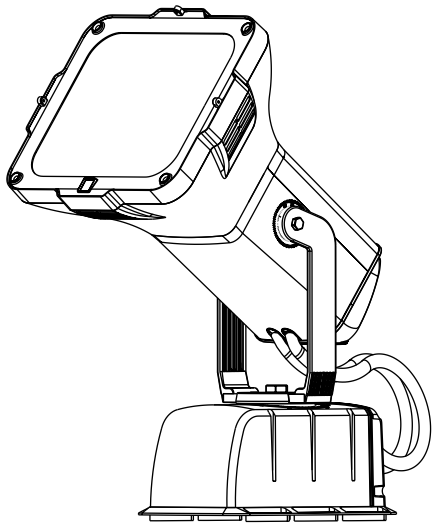
PLS (Plasma Lighting System)

SERVICE MANUAL

Caution: Please read the “**Safety precaution**” before repairing the product.

Model: PSF1032A



Contents

1. Safety precaution

Caution: PLS product operates at high temperature and generates high voltage at the power supply. Because it can cause serious injury such as electric shock or burn when handling the product, please read follow the check order as shown below.

1. Installation and repair/check precaution
   - Never disassemble the product unless done by specialized service technician. (It can cause safety accidents such as electric shock or fire.)
   - When servicing the product, unplug the power cord and make sure that the power is completely disconnected.
   - When repairing or checking the PLS product immediately after operating the product, wait until the system is cooled sufficiently.
   - If PLS is abnormally turned off, always handle the product after disconnecting the power. (It can cause electric shock or leakage of electromagnetic wave.)
   - If the product is wet, always wipe out the moisture before working on the product.
   - Clean the front cover glass periodically to maintain the illumination.
   - Do not directly look into the bulb while the product is operating. The strong light can cause visual defect to the eye.

2. Check grounding
   - Before working on the product, check whether the product is grounded and make sure to ground the product if not done so.

3. Electricity connection test for troubleshooting
   - Install the repair jib on flat floor and mount the PLS product, and then connect the power.
   - Do not leave any flammable material around the product and keep a safe distance as defective parts can heat up to start a fire.
   - Because the heat can be concentrated on the illuminated area, keep more than 30cm of distance from flammable material or from the floor.

4. Check and replacement method for electric parts
   - When checking the electric part immediately after disconnecting the power, discharge the high voltage part of the PCB before doing so. (High voltage capacitor and lightron high voltage charge can cause electric shock.)
   - When the electricity is connected, never touch the power circuit. (High voltage of DC 3500V~4000V is generated on the high voltage part.)
   - Do not use parts that do not comply with the specification. (It can cause an error.)
   - When there is an issue with the power circuit, it is difficult to replace the individual parts installed on the PCB. Therefore replace the entire power supply.
     ※ Caution: When using devices such as tester to check for error, always disconnect the electricity before using.

5. Electricity/Operation test after repair
   - Never operate the product when it is not fully assembled such as lightron disassembled and waveguide separated etc. It can cause strong leakage of electromagnetic wave.
   - Connect the electricity in normal condition after sufficiently checking the electric/mechanical assembly of parts, wiring condition and grounding connection etc.

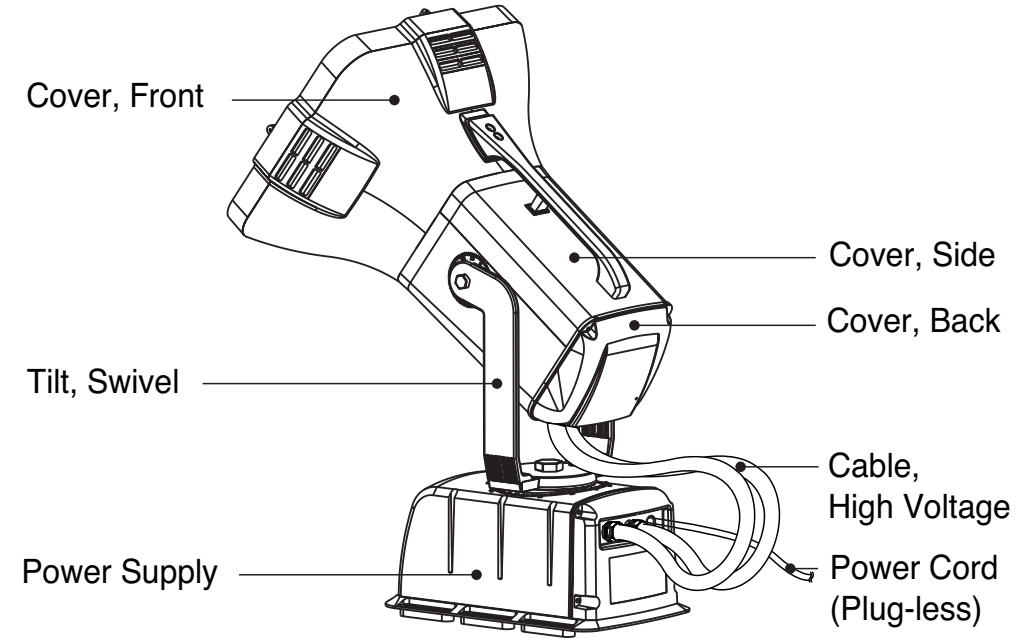
6. Correct installation and grounding check
   - After repairing the PLS product, clean the exterior and interior of the main unit and check the grounding condition. And then install the product in its original position.

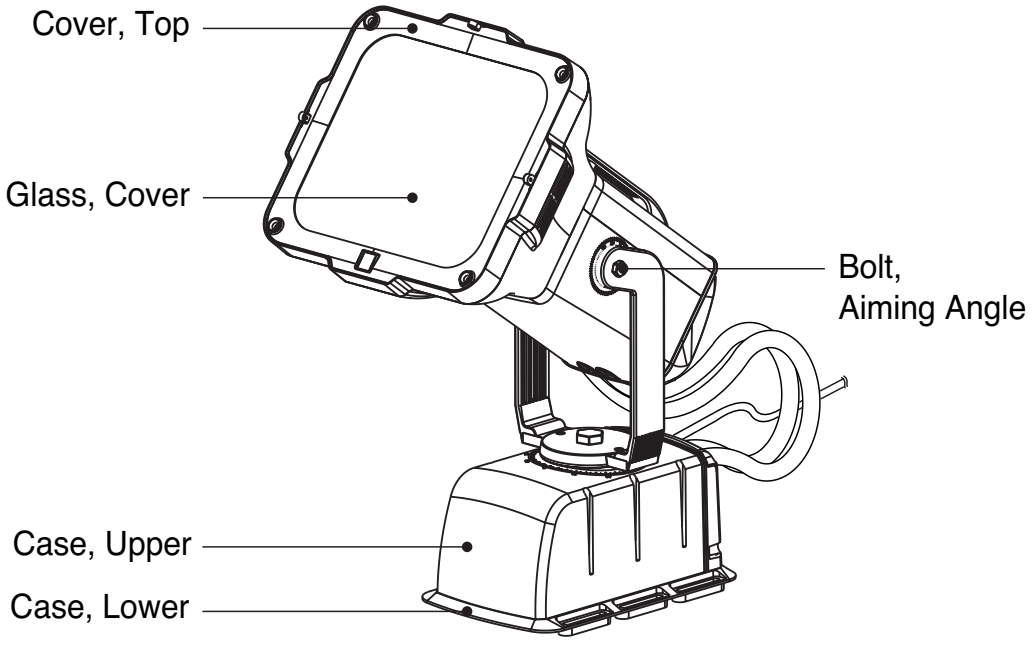
2. Product specification

No.	CLASSIFICATION		SPECIFICATION
1	Rated voltage (AC)		Single phase 220-240 V / 50 Hz
2	Rated current (AC)		4.7A ± 5%
3	Power consumption		1,000W
4	High frequency output (Microwave)		450 W
5	High frequency		2450 MHz ± 50 MHz
6	Lightron		2M214.A03GPTF
7	Optical speed		85,000 lm
8	Optical efficiency		85 lm/W
9	Color temperature		4,500 K 5,500 K 7,500 K
10	Color rendering index		80 Ra
11	Dimension (L x W x H)		L570 x W440 x H680 mm
12	Weight (kg)		21 kg
13	Safety device	Fuse	Block overcurrent above specification: 250 V, 10 A
		Thermostat	Prevent overheating of LTN: 130 ˚C / 70 ˚C
		Abnormal voltage detection	Over: 264V or above Under: Block system when 176V or below
		Thermistor	Prevent overheating of power supply module: 75 ˚C
		Input current check	Detect oscillation of lightron
14	Characteristics		• Optical spectrum near natural light (Comfortable lighting) • Lighting speed of 20 seconds • Long life with high optical speed and high color rendering • Environment friendly lighting device with high energy efficiency

※ Above specification and safety circuit may change without separate notification.

3. Exterior and name





4. Installation environment and method

▣ PSF1032A installation environment guide

[● : Can be installed, ▲ : Request for consultation, × : Cannot be installed]

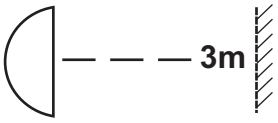
Installation environment		PSF1032A
Application classification	Temperature range of use (˚C)	-20 ~ +40 ˚C
	Humidity range of use (%)	80% or less
	Indoor installation (Fixed downward)	×
	Plant	●
	Indoor gym	●
	Warehouse	●
	High rise building (Indoor)	●
	Large building (Indoor)	●
	Square or play field	●
	Park	●
	Large bulletin board	●
	Large wall	●
	Bridge	●
	Environment with high temperature and humidity	▲
	Environment with use of gas	×
	Area with vibration	▲
	Area with metallic dust	▲
	Operating time of 24 hours/day	▲
	Operating time of 16 hours/day	●
	Operating time of 10 hours/day	●
	Operating time less than 10 hours/day	●
	Area difficult for A/S	▲
	Wireless LAN	●
Power supply	Input power condition	Single phase 220V ± 15%
	Power wiring (mm^2/unit)	2.0 mm^2 or above
	Wiring per switch	3 or less
	Circuit breaker capacity (Per unit)	10A or above
	Main wiring (mm^2)	–
	- When wiring 2 units	3.5 mm^2 or above
	- When wiring 4 units	5.5 mm^2 or above
	- When wiring 6 units	8.0 mm^2 or above
	- When wiring more than 6 units	Request for consultation

※ To maintain safety of high voltage power and to prevent malfunction, connecting the grounding cable to each PLS set.

※ Above conditions related to power must be complied. If changes are required, please contact LG for consultation.

▣ Installation method and example

1) This model (PSF1032A) is designed to be installed outdoors and supports day to day water proofing.
2) To prevent the product from falling by wind or other external force, use the bolt and nut of M8 or above.
3) Be careful not to let other objects interfere with product from cooling and also be careful not to block the inlet/outlet when installing the product.
4) Installing the product in an environment that exceeds the usable temperature and humidity can cause unexpected issues. Therefore always consult with LG Electronics before installing the product.
5) Installing the product in locations where chemicals such as TCE series or chlorine gas are used or locations where vibration is excessive can cause unexpected issues. Therefore always consult with LG Electronics before installing the product.
6) When using the product in highly dusty area, the illumination can be reduced due to the dust. Therefore periodically clean the product and do not install the product where metallic dust is generated.
7) Install at least 1m from the ground clearance distance must be maintained.
8) The mark means min. distance from PLS to lighted object when install the PLS, check the distance from PLS on the optical axis of PLS.



CAUTION

1. Follow regulations of government agency for technical standard and electric power company's guide regarding regulations on equipment and wiring.

⚠ WARNING

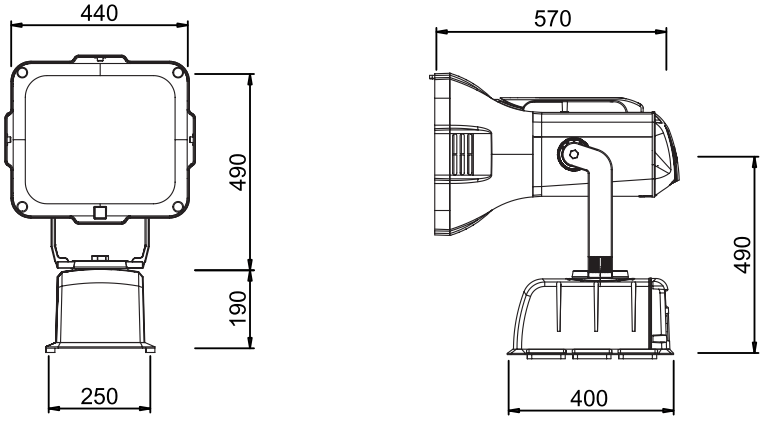
- By the regulation and this installation guide, electric work using a specific circuit must be done by certified electric technician. It can cause fire or electric shock if capacity of power supply circuit is insufficient or faulty.

2. Do stated earth work when installing PLS

⚠ WARNING

- Do earthwork of PLS. Do not connect earth wire with gas pipe, water pipe, lightning rod or telephone line. It can cause electric shock as it makes earthwork incomplete.

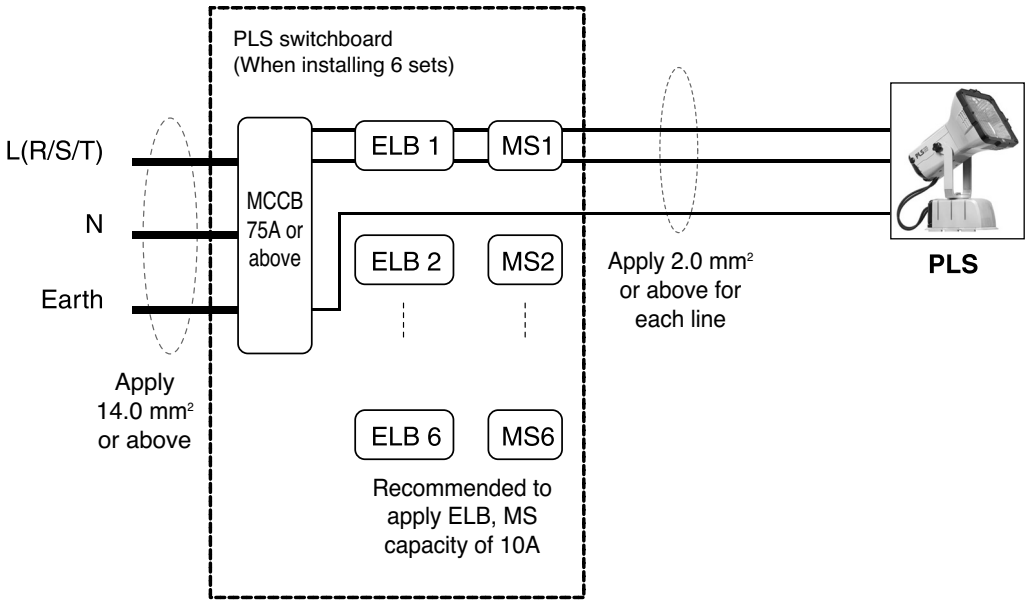
※ Product size



(Units : mm)

※ Power condition and switchboard configuration for PLS installation

- Because the power consumption per 1 set of PLS is high, the cross sectional area of the switchboard must appropriately be applied, and for stable operation, one control switch must be installed for each set.
- Grounding requires more than 3 grounding points and must be wired for safety purposes.



* PLS is not equipped with a terminal block. For installation, please get professional assistance.
  - Terminal Block Specification
    (a) Rated Voltage: 250V or above
    (b) Rated Power: 10A or above
    (c) 3 way bolt fastening type
  - After connecting power line to the terminal block, ensure that the power line makes secure contact with fastening bolt or clamp and the power line is securely fastened.

⚠ WARNING

- After wiring power line to terminal box, check if the line touches tightening bolt or clamp or is being forced.
- Use regulated electric wire so connecting part of terminal is knocked out by external force. It can cause fire if connecting part is fixed tightly as it generates heat.
- Wire power line after ring terminal work. It can cause fire and failure of electric parts.
- Check Neutral status when installing main power
- Ending part of PLS has to be waterproof when connecting it to terminal.

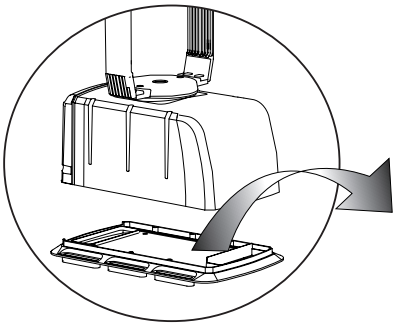
Note)
MCCB: Molded Case Circuit Breaker
ELB: Earth Leakage Circuit Breaker
Use rate sensitivity current (Break current) of 30 [mA]
MS: Magnetic Switch (Used when applying GPS or auto flash device)

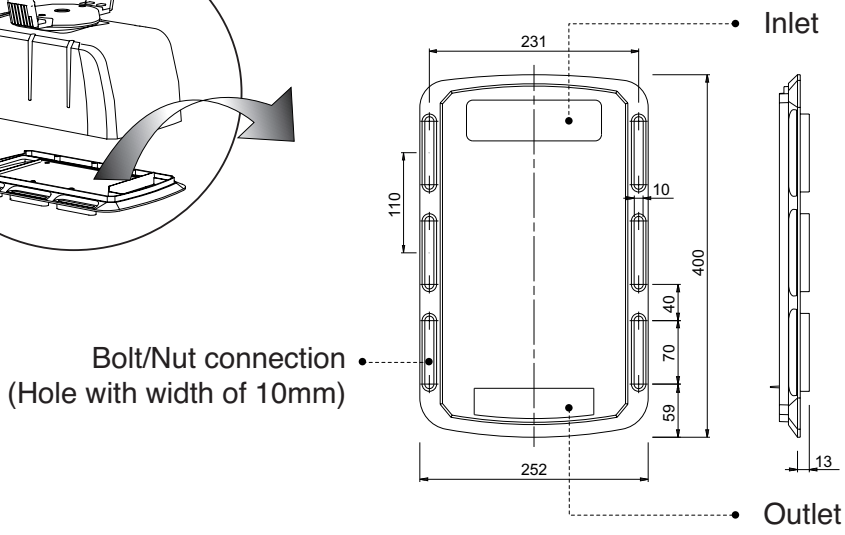
※ Lower Case and Base Plate size

Case Lower

– Refer to the dimension of the case below the power supply and fixate the product.

(Units : mm)

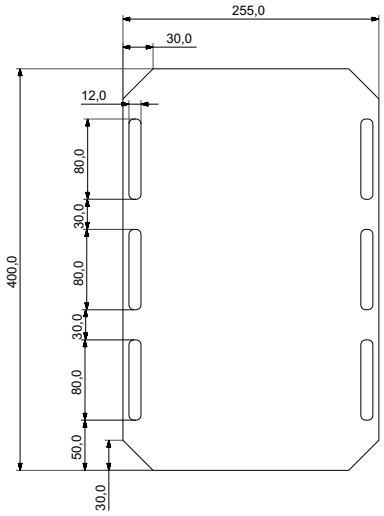




Base plate to fixate product (Separately manufactured)

– Considering the safety of the system and installation, it is recommended to manufacture the base plate separately to fixate the product. Refer to the following drawing.
(Not included in the product)

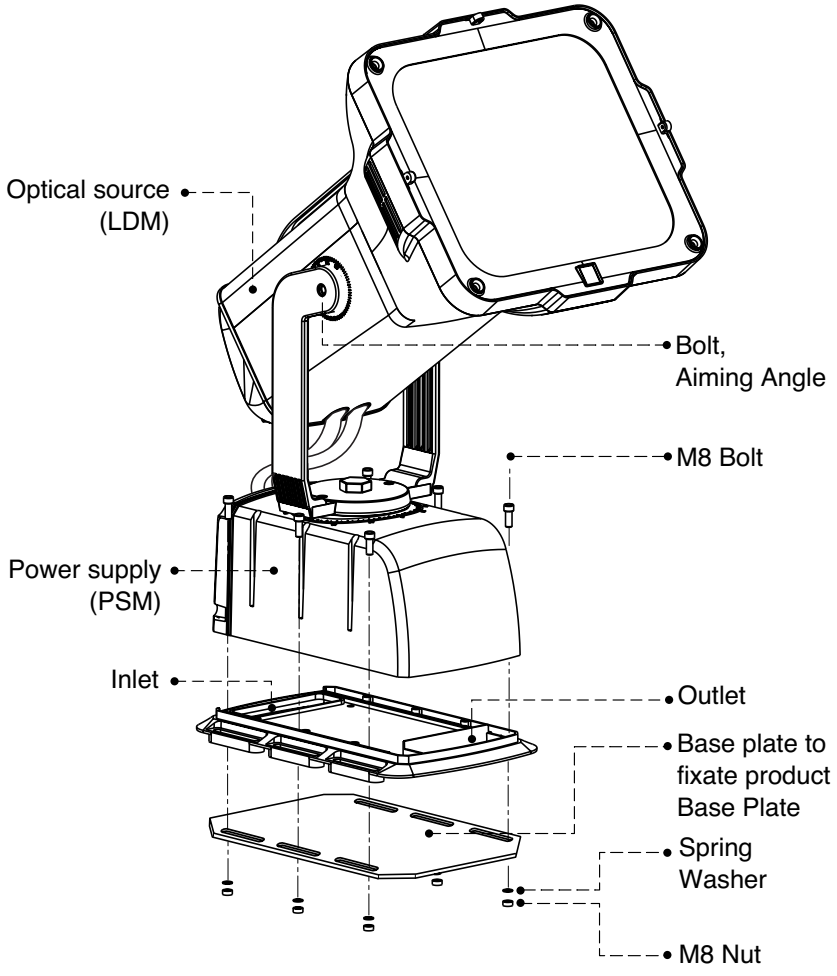
– If the base plate is not required, install the product by considering the cooling path (Inlet/Outlet) of the system.



▶ When manufacturing the base plate to fixate the product, always use steel plate of L400xW272 (mm) 5T or above.

(Units : mm)

※ Installation example



- Install the product on even ground free from submersion.
- When adjusting the bolt (M12 bolt, aiming angle) to adjust the PLS angle, always use a spanner and maintain torque of 40kgf.cm or above.

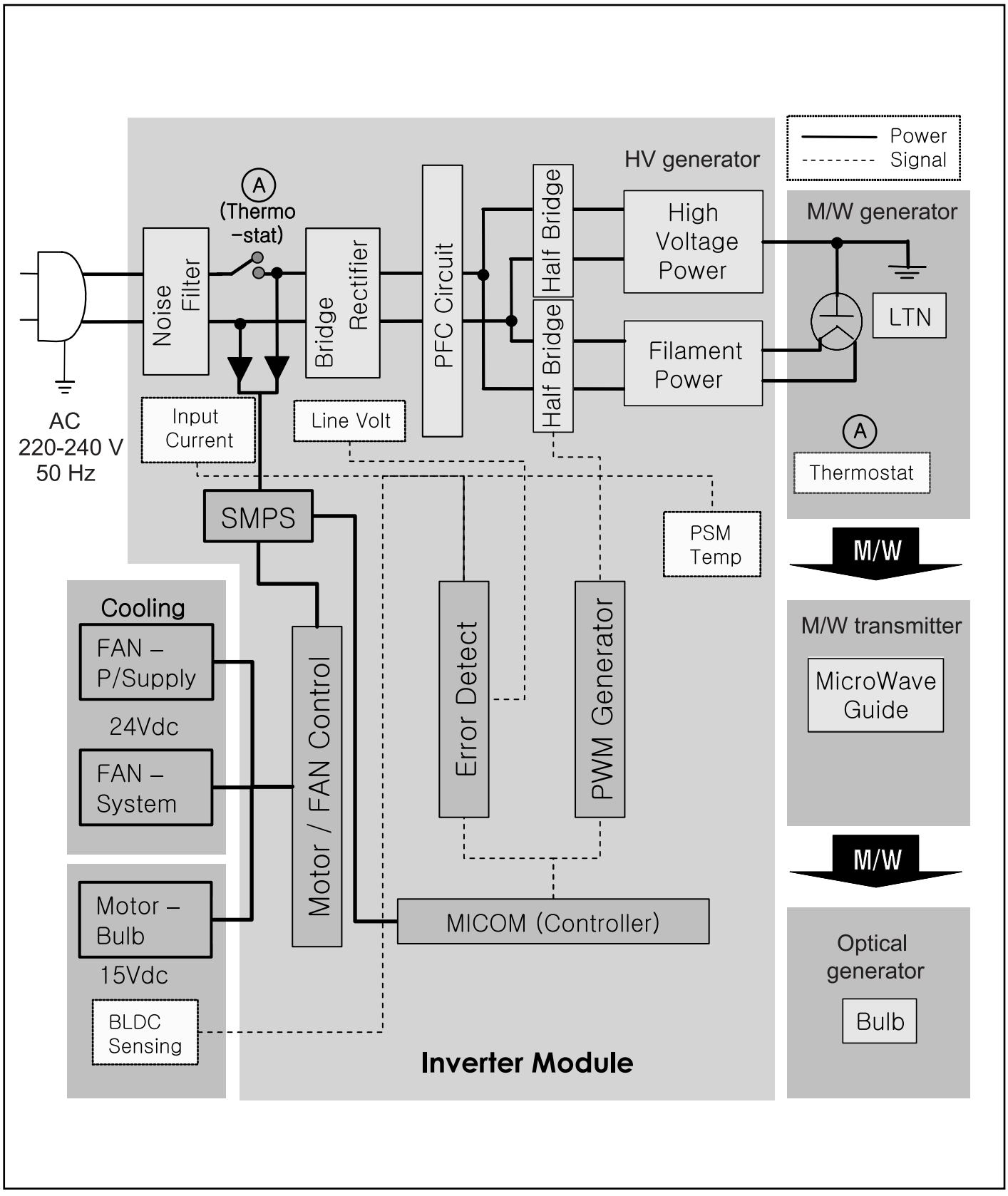
▣ Example of incorrect installation

※ Below shows the example of incorrect application/usage. Be careful with installation and usage in the following cases as it can cause electric shock, injury, burn etc.

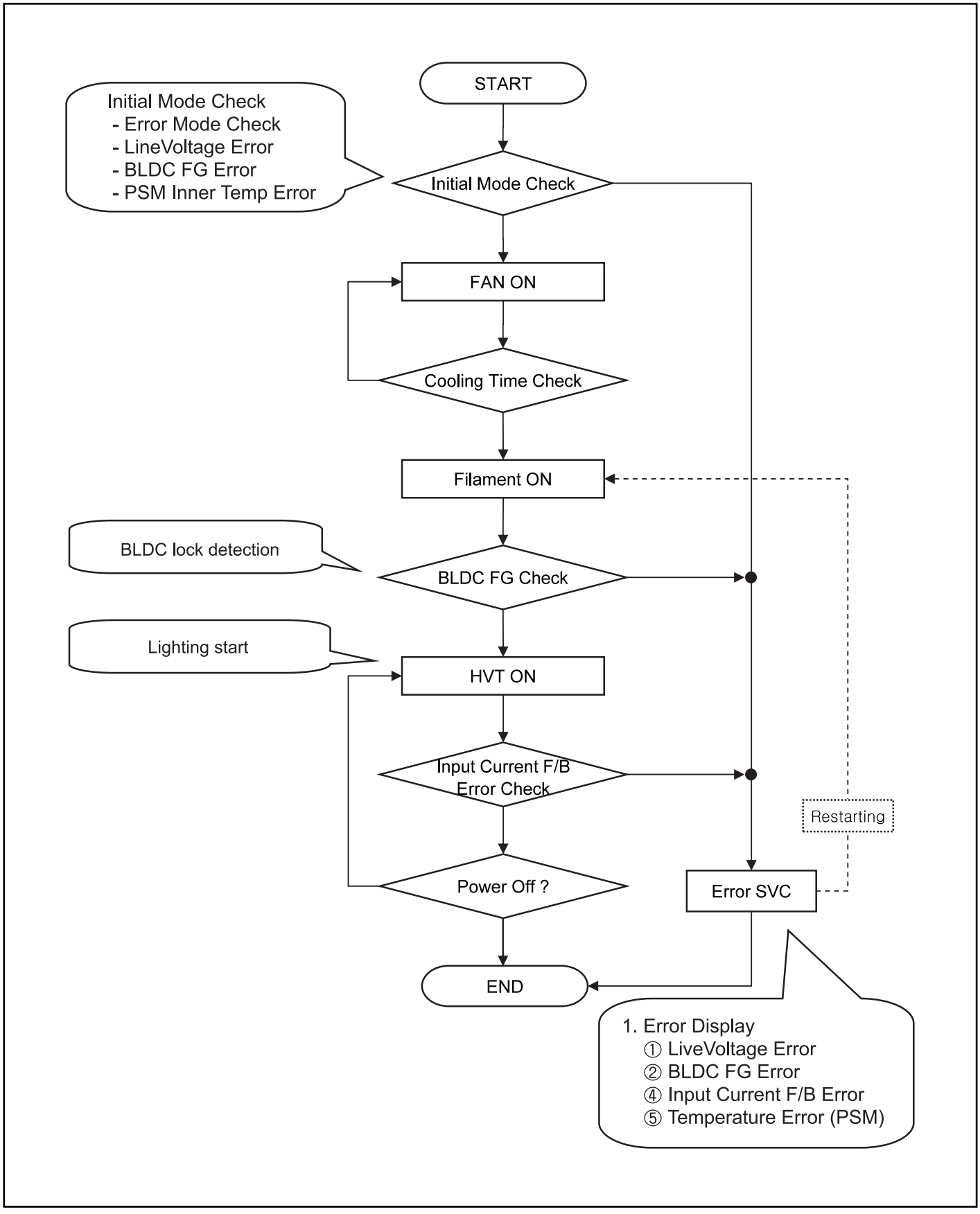
No.	Example of incorrect application and usage	Expected risk
1	When using with impact, such as product falling, applied on product	Fire/Electric shock
2	When using with switchboard below rated current capacity	Fire/Electric shock
3	When product is disassembled and reconfigured arbitrarily	Fire/Electric shock
4	When installing/using product without securing space to cool the product	Fire
5	When fixed/used loosely without considering the installation board, product weight/vibration etc.	Injury
6	When installing, repairing and checking the product in an environment where water can penetrate into the product. This product can be used for underwater lighting (Underwater scenery, exploration, event usage etc.)	Electric shock
7	When using the PLS product without repairing after submersed under water	Fire/Electric shock
8	When using the product in condition with excessive power voltage variance (Above ±15%)	Fire/Electric shock
9	When using the product without grounding	Electric shock
10	When excessively bend the power cord or using damaged power cord	Fire/Electric shock
11	When inserting any pin, coin or metal wire into the internal/external hole on the case	Fire/Electric shock
12	When putting a cover on the exterior of the product for use without considering the suction inlet/exhaust outlet	Fire
13	When using the product with flammable material around the product	Fire/Electric shock
14	When disassembling while the product is operating	Fire/Electric shock
15	When repairing or disassembling the product by an unqualified technician	Fire/Electric shock
16	When using in environment where alien particles penetrate into the suction inlet/exhaust outlet	Fire
17	When cleaning or repairing the product while operating the product	Electric shock
18	When touching the power cord with wet hands	Electric shock
19	When using the product for purpose other than lighting (Heating food, drying clothe, heating etc.)	Fire/Electric shock
20	When moving the product by holding the part other than the main unit (Moving by holding the reflector etc.)	Injury
21	When moving the part without caution not considering the weight of the product	Injury
22	When not wearing any safety gear when contacting the hot part (Cover glass, reflector etc.)	Injury
23	When using the product near a heating device	Fire/Explosion
24	When installing and using the product near areas with risk of flooding	Electric shock
25	When cutting and using the power cord arbitrarily	Fire/Electric shock
26	When making body contact on the product when it is hot while operating or immediately after operating	Injury
27	When installing and using the product in areas not properly ventilated	Fire
28	When using underwater	Electric shock

5. Operating principle and description

▣ Block Diagram



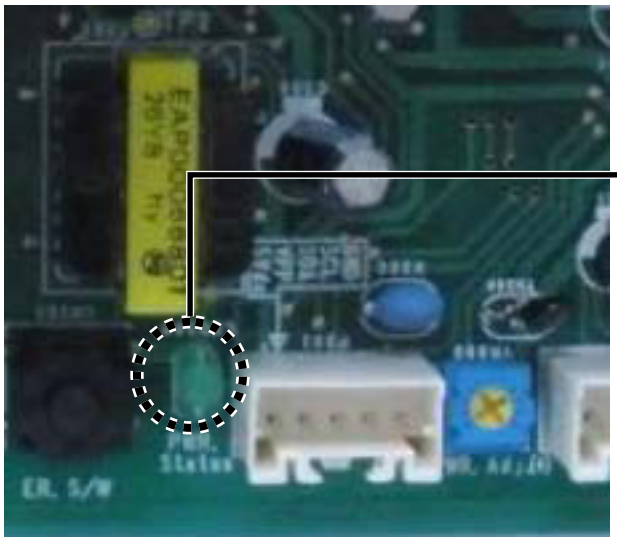
▣ PLS operating order



▣ Drive PCB diagram

※ PSF1032A PCB ASSEMBLY INVERTER

※ PSF1032A LED error display



※ LED error display

No. 1: Input voltage error
No. 2: BLDC error
No. 4: Input current error
No. 5: Inverter internal temperature error

6. Troubleshooting

▣ Error mode and action

*** Caution: First, check whether the power cord is unplugged from the outlet and then check/repair according to the safety precaution and procedure.**

Error mode	Check point	Check method	Action item 1	Action item 2 (If not resolved by action item 1)
Does not light up initially	Check whether the power cord and other internal wiring is done correctly	Check for any issue on L, N, GND and internal wiring	Check wiring based on installation standard and internal wiring	
	Check whether the fuse is disconnected	Separate the noise filter box of the power supply and visually check whether the fuse is disconnected	Replace PSM (Power Supply Module)	
	Check error check mode: Flash error LED 1 time	Check the input power voltage		
	Check error check mode: Flash error LED 2 times	Check whether BLDC rotates	Replace bulb assembly	
		Check BLDC cable wiring	Connect the cable	
	Check system power consumption	After checking the power consumption using the measuring device, check whether it is normal	If normal, replace the bulb assembly	Replace generator assembly
Lamp goes off trying to turn on	Check whether DC fan of LDM part is operating normally	Check system DC fan cable	Connect the cable	Replace DC fan
	Check error check mode: Flash error LED 5 times	Check whether PSM cooling fan is operating and whether there is any issue with wiring	Connect the cable	Replace DC fan
	Check error check mode: Flash error LED 1 time	Check input power voltage		
	Check resonator condition	Check if the resonator is crushed or have any holes	Replace LDM (Light Drive Module)	
Lamp is dark	Check system power consumption	Check the system power consumption using the measuring device	Replace PSM	Replace generator module

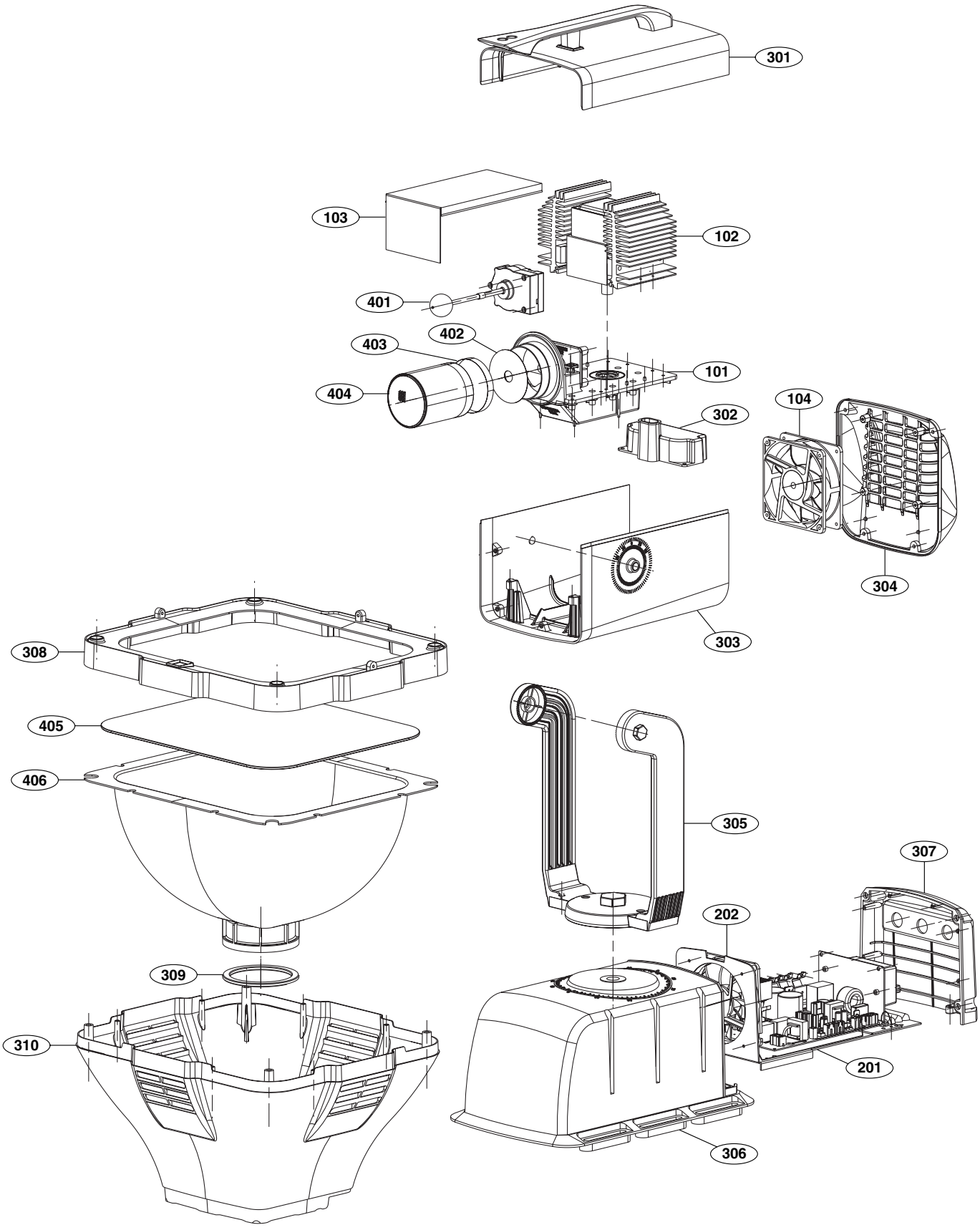
▣ Error check mode and resolution

Error Code	Error display	Error detail (Check limit)	Check point
1	Error LED on-and-off 1 time (● ● ●→)	Line Voltage Error Check (220V ± 15% or more)	Unstable input power voltage and operation with overvoltage
2	Error LED on-and-off 2 times (●● ●● ●●→)	BLDC FG Error Check (Less Than BLDC 1,400 RPM)	Check whether BLDC is locked and whether BLDC cable is connected
4	Error LED on-and-off 4 times (●●●● ●●●●→)	Input Current Error Check (Unstable lightron oscillation)	Check whether the lightron is operating normally and whether the system fan is operating
5	Error LED on-and-off 5 times (●●●●● ●●●●●→)	P/Supply Inne Temperature Error Check	Check whether the PSM cooling fan is operating

▣ Error cancelation method

Control PCB error Cancel error using clear switch	1. Turn on power line 2. Check error LED 3. Press the error clear switch for 2 seconds. (Wait until the flashing LED is turned off) 4. Wait 30 seconds after the power line is turned off. (Discharge fully) 5. Check for relighting
Cancel error using power line	1. Turn on power line 2. Turn off power line between 3~5 seconds 3. Repeat 1~2 process 5 times. 4. Wait 30 seconds after the power line is turned off on the last 7th time. (Discharge fully) 5. Check for relighting

7. Disassembly diagram



8. Replacement Parts List

LOC NO.	PART NO.	DESCRIPTION	SPECIFICATION	EA	No.
Generator Assembly, Microwave					
101	AEC70519301	Guide Assembly, Wave	Waveguide Assembly, PSF10	EA	1
102	ADZ72910401	Generator Assembly, Microwave	PSF1032A, 7500K	EA	1
103	MAZ62067401	Bracket, Fan	PRESS AL 1 Air Guide	EA	1
104	EAL31553601	Fan Module	4715K 2.95kRPM DC 24V	EA	1
Power Supply Assembly					
201	EBR62853901	PCB Assembly	NYX1k Inverter Assembly (BLDC & Filament Control)	EA	1
202	EAL38070201	Fan Module	4710KL-05W-B40, 2.5kRPM DC 24V	EA	1
203	EAD60973001	Cable Assembly	KR010816-01 2P Housing / Spade Terminal 1.21M 12Pin Black	EA	1
Cover Assembly					
301	ACQ75452201	Cover Assembly, Side	PSF1032A	EA	1
302	MBL62598101	Cap, Protector	MOLD IIR PSF10 Cable Box	EA	1
303	MCK62733701	Cover, Side	Casting ADC12 290 200 155	EA	1
304	MCK62733801	Cover, Rear	Casting ADC12 200 200 63	EA	1
305	3043Z-FB02A	Supporter Assembly	Flood900 SP	EA	1
306	3111300001A	Case Assembly	PSF09	EA	1
307	3110Z-L006A	Case, Rear	AL Diecasting	EA	1
308	3550Z-T006A	Cover, Top	AL Diecasting	EA	1
309	MDS39999701	Gasket, Packing	Complex Plate & Waveguide	EA	1
310	3550Z-F005A	Cover, Front	AL Diecasting	EA	1
Generator Assembly, Optic & Guide Assembly, Optic					
401	ABD72910201	Bulb Assembly, Motor	PSF1032A, 7500K	EA	1
402	5018Z-L001A	Mirror	Sintering Quartz OD76	EA	1
403	4016Z-M001A	Strap, Resonator	SUS, OETCK(DEUCH)	EA	1
404	AKD72909201	Resonator Assembly	ALUMINUM5052 0.5t	EA	1
405	MCK63206601	Cover, Optic	SINTERING GLASS 370 320	EA	1
406	3035300002B	Reflector Assembly	Neo PSF10 10Deg	EA	1

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October, 2010
Printed in Korea